Docket No. 837.1186

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of:

Yoshitaka SHIMURA et al. | (IN TRIPLICATE)

Serial No. 09/168,688 | Group Art Unit: 2633

Confirmation No. 2794

Filed: October 9, 1998 | Examiner: D. Singh

For: OPTICAL SENDER, TERMINAL DEVICE, AND OPTICAL COMMUNICATION SYSTEM EACH HAVING THE OPTICAL SENDER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF OF APPELLANTS

In a Notice of Appeal filed September 24, 2003, the Applicant appealed the Examiner's March 25, 2003 Office Action finally rejecting claims 2-21 and 23-44. A fee of $330.00 is being submitted herewith along with a Petition for a One-Month Extension of Time and the fee for same. Therefore, Appellant's brief is due December 24, 2003. Appellant's brief together with the requisite fee set forth in 37 CFR § 1.17(f) is submitted herewith.

I. REAL PARTY IN INTEREST (37 CFR §1.192(c)(1))

The real party in interest is FUJITSU LIMITED, the assignee of the subject application.

II. RELATED APPEALS AND INTERFERENCES (37 CFR § 1.192(c)(2))

Appellant, Appellants' legal representatives, and assignee are not aware of any other appeals or interferences which directly affect or be directly affected by, or having a bearing, on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS (37 CFR §1.192(c)(3))

Appealed claims 2-21 and 23-44 have been rejected.

IV. STATUS OF AMENDMENTS (37 CFR §1.192(c)(4))

The Amendment filed on July 25, 2003 in response to the Final Office Action mailed March 25, 2003, was entered.

V. SUMMARY OF INVENTION (37 CFR §1.192(c)(5))

Referring to FIG. 1 through FIG. 24, the features of the present invention as set forth in claims 2-21 and 23-44 are summarized below.

The present invention relates generally to prevention of interchannel crosstalk in wavelength division multiplexing (WDM), and more particularly, to an optical sender, terminal device, and optical communication system, each having the optical sender suitable for application to WDM. As recited in claim 10 of the present invention, for example, an optical sender 12 comprises a light source 20, an optical modulator 24, and a shutting down means 56. The light source 12 outputs a light beam. The optical modulator 24 modulates the light beam in accordance with a main signal to output an optical signal. The shutting down 56 means shuts down the optical signal when receiving a wavelength alarm relating to the wavelength of the light beam. The shutting down means 56 comprises an optical element 48 for receiving the optical signal output from the optical modulator 24, and means for controlling the optical

element 48 so that the transmittance of the optical element 48 is reduced when receiving the wavelength alarm. See, for example, FIGS. 1 and 5 of the Applicant's specification.

As shown in FIG. 5, a control unit 46 includes an optical element 48 for receiving an optical signal output from the optical modulator 24, a combination of switches 50 and 52, optical output circuit 54, and an optical shutdown circuit 56 for changing the transmittance of the optical element 48 according to a given condition.

A wavelength supervisory circuit 58 is connected to the wavelength monitor 22, so as to generate a wavelength alarm relating to the wavelength of a light beam output from the laser diode 20 or the wavelength of an optical signal output from the optical modulator 24. The wavelength supervisory circuit 58 outputs a wavelength alarm, for example, when the wavelength detected by the wavelength monitor 22 has been deviated from a predetermined range. An output signal from the wavelength monitor 22 is supplied through the wavelength supervisory circuit 58 to the ATC circuit 42.

A power supervisory circuit 60 is connected to the ACC circuit 44, so as to generate a power alarm relating to an on/off signal of a power supply in the optical sender. The power supervisory circuit 60 outputs a power alarm, for example, when the supply of a current (power) from the ACC circuit 44 to the laser diode 20 becomes on or off, and continues the output of the power alarm during a predetermined period of time.

The wavelength alarm and the power alarm are supplied through an OR circuit 62 to the control unit 46. When the control unit 46 receives at least one of the wavelength alarm and the power alarm, the optical element 48 is controlled so that the transmittance of the optical element 48 is reduced.

More specifically, when at least one of the wavelength alarm and the power alarm is supplied to the control unit 46, the optical shutdown circuit 56 is selected by the switches 50 and 52, thereby reducing the transmittance of the optical element 48 according to the operation of the optical shutdown circuit 56. Conversely, when none of the wavelength alarm and the power alarm is supplied to the control unit 46, the optical output circuit 54 is selected by the

switches 50 and 52, thereby increasing the transmittance of the optical element 48 according to the operation of the optical output circuit 54.

When the transmittance of the optical element 48 is low, the optical signal from the optical modulator 24 is blocked by the optical element 48 to thereby prevent interchannel crosstalk in the case of using this optical sender as each of the optical senders 12 (#1 to #N) shown in FIG. 1. When the transmittance of the optical element 48 is high, the optical signal from the optical modulator 24 can be output from this optical sender, thereby allowing transmission of the optical signal.

VI. ISSUES (37 CFR §1.192(c)(6))

A first issue is whether claims 2-21 and 23-42 patentably distinguish over U.S. Patent 5,920,414 to Miyachi et al. in view of U.S. Patent 6,031,647 to Roberts. A key subissue is whether the Miyachi and Roberts references teach or suggest a shutting down means having a means for controlling an optical element so that the transmittance of the optical element is reduced when receiving a wavelength alarm.

A second issue is whether claims 43 and 44 patentably distinguish over U.S. Patent 6,040,931 to Miyazaki. A key subissue is whether Miyazaki teaches or suggests an optical sender having a shut-down device to shut down an optical signal when receiving a wavelength alarm relating to a wavelength of a light beam, wherein in the wavelength alarm is provided inside the optical sender.

VII. GROUPING OF CLAIMS (37 CFR §1.192(c)(7))

Claims 2-21 and 23-42 stand or fall together.

Claims 43 and 44 stand or fall together.

VIII. ARGUMENT (37 CFR § 1.192(c)(8))

In the Final Office Action, the Examiner rejected claims 2-21 and 23-42 under 35 U.S.C. § 103(a) as being unpatentable over Miyachi et al. (USP# 5,920,414) in view of Roberts (USP#

6,031,647). The Examiner also rejected claims 43 and 44 under 35 U.S.C. § 103(a) as being unpatentable over Miyazaki (USP# 6,040,931).

Miyachi et al.

Miyachi et al. relates to a wavelength division multiplexing optical transmission apparatus and optical repeater. Miyachi teaches that an abnormality decision section 47 outputs an abnormality signal to an alarm generator 48 when a wavelength difference has exceeded an allowable value. When receiving the abnormality signal, an alarm generator 48 gives an alarm to notify an operator. See column 13, lines 23-27 and Figs. 6 and 7.

Roberts

Roberts relates to an optical transmission system in which changes in optical power are anticipated and damped by controlling the transmitter output power. In column 5, lines 1-3, Roberts indicates that such changes may come from alarm signals indicating that a particular optical source may be at risk of failing. As shown in Fig. 7 and column 7, lines 17-25, Roberts discloses a damping means 73 alternatively incorporated in a transmitter and controlled by a control means 74, which is responsive to means for determining changes in the optical power. The changes can be determined from detecting alarms which indicate conditions which may lead to a change in power level.

Miyazaki et al.

Miyazaki relates to an optical communication system having an optical transmitter which includes a shut-off unit 26. The shut-off unit 26 shuts off an optical signal when a parameter determining or depending on a wavelength of the optical signal does not satisfy a predetermined condition. See column 4, lines 29-42.

Group 1: Claims 2-21 and 23-42

The present invention as recited in claim 10 relates to an optical sender including a shutting down means comprising "means for controlling the optical element so that the transmittance of the optical element is reduced when receiving the wavelength alarm."

In the present claimed invention, the optical signal is shut down in accordance with the wavelength alarm. Thus, in starting up or shutting down a system including the optical sender or in case of an error relating to, for example, temperature control performed in the optical sender, an optical signal whose wavelength is deviated from a predetermined range can be prevented from being output from the optical sender. As a result, when the optical sender outputs an optical signal, the wavelength of the optical signal is maintained within the predetermined range. Therefore, interchannel crosstalk can be prevented.

The Examiner agrees that Miyachi does not disclose shutting down an optical signal when receiving an alarm, but believes that Roberts teaches shutting down (i.e., damping) the optical source. The Examiner believes that it would have been obvious to provide a shut off device as taught by Roberts in order to shut down or reduce the optical transmittance of an optical source. Thus, the Examiner states that the motivation of providing a shut off device is to reduce or eliminate crosstalk.

Roberts is silent regarding the teachings of a WDM system configured to reduce or eliminate interchannel crosstalk. Instead, Roberts teaches a method for attempting to eliminate or minimize the transient effect of one channel or another in an optical amplified system, by improved gain control, once the transient reaches the sensitive element (see column 2, lines 20-23). Thus, Roberts merely discloses a method suitable to various optical elements sensitive to power changes (see column 1, lines 52-62).

In light of the above, it cannot be suggested that one of ordinary skilled in the art would have been motivated to combine the teachings of Roberts with Miyachi to disclose the features recited in claim 10 of the present application. The mere fact that references *can* be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP § 2143.01. Specifically, there must be a

suggestion or motivation in the references to make the combination or modification. Therefore, Miyachi and Roberts, either alone or in combination, do not teach or suggest a shutting down means having a means for controlling an optical element so that the transmittance of the optical element is reduced when receiving a wavelength alarm.

Similar to claim 10, independent claims 19, 20, 31, 40, and 41 recite "shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam," which distinguish over the teachings of Miyachi and Roberts.

Group 2: Claims 43 and 44

The present invention as recited, for example, in claim 43 relates to an optical sender which comprises "a shut-down device shutting down the optical signal when receiving a wavelength alarm relating to a wavelength of the light beam, the wavelength alarm being provided inside the optical sender.

Miyazaki discloses an optical communication system having an optical transmitter which includes a shut-off unit 26.

Regarding the teachings of Miyazaki, the Examiner believes that since the shut-off units shuts down the optical signal if the monitored wavelength parameter does not satisfy the predetermined condition, it would have been obvious to indicate that a signal, which is transmitted from the monitor and judgment device that causes the shut off circuit to shut down the optical signal, is an alarm signal.

However, Miyazaki does not provide any motivation that would suggest to one of ordinary skill in the art that Miyazaki teaches a shut-down device which shuts down an optical signal when receiving a wavelength alarm. Moreover, the Examiner has not presented any evidence in support of the same and instead, relies upon subjective belief and unknown authority. Therefore, it is respectfully submitted that Miyazaki does not teach the claimed shut-down device as recited in claim 43 of the present application.

Similar to claim 43, claim 44 relates to a method comprising "shutting down the optical signal when receiving a wavelength alarm," which distinguishes over Miyazaki.

IX. CONCLUSION (37 CFR § 1.192(c)(9))

In summary, it is submitted that claims 2-21 and 23-44 patentably distinguish over the prior art. Reversal of the Examiner's rejection is respectfully requested.

* * *

The Commissioner is authorized to charge any Appeal Brief Fee or Petition for Extension of Time fee for underpayment or credit any overpayment to Deposit Account No. 19-3935.

Respectfully submitted,
STAAS & HALSEY

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X. APPENDIX (37 CFR § 1.192(c)(10))

1. (cancelled)

2. (previously presented) An optical sender according to claim 10, further comprising:

a circuit for supplying a power to said light source; and

a power supervisory circuit for monitoring on/off of supply of the power to said light source and outputting a power alarm during a given time period from a time the supply of the power to said light source becomes on or off.

3. (original) An optical sender according to claim 2, wherein said power supplying circuit comprises a constant current source.

4. (previously presented) An optical sender according to claim 10, further comprising:

a wavelength monitor for detecting the wavelength of said light beam; and

a circuit for outputting said wavelength alarm when the wavelength detected by said wavelength monitor is deviated from a predetermined range.

5. (original) An optical sender according to claim 4, further comprising means for controlling said light source so that the wavelength detected by said wavelength monitor is maintained constant.

6. (original) An optical sender according to claim 5, wherein:

said light source comprises a laser diode; and

said controlling means comprises means for controlling the temperature of said laser diode.

7. (original) An optical sender according to claim 4, wherein said wavelength monitor is provided between said light source and said optical modulator.

8. (original) An optical sender according to claim 4, wherein said optical modulator is provided between said light source and said wavelength monitor.

9. (previously presented) An optical sender according to claim 4, wherein:

said light source comprises a laser diode for outputting a forward beam and a backward beam; and

said forward beam being supplied to said optical modulator, said backward beam being supplied to said wavelength monitor.

10. (previously presented) An optical sender comprising:

a light source for outputting a light beam;

an optical modulator for modulating said light beam in accordance with a main signal to output an optical signal; and

means for shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam, said wavelength alarm being provided inside the optical sender, and

said shutting down means comprising:

an optical element for receiving said optical signal output from said optical modulator; and

means for controlling said optical element so that the transmittance of said optical element is reduced when receiving said wavelength alarm.

11. (original) An optical sender according to claim 10, wherein said optical element is a Mach-Zehnder type lithium niobate modulator.

12. (original) An optical sender according to claim 10, wherein said optical element is a Mach-Zehnder type semiconductor modulator.

13. (original) An optical sender according to claim 10, wherein said optical element is an electroabsorption type modulator.

14. (original) An optical sender according to claim 10, wherein said optical element is a semiconductor optical amplifier.

15. (previously presented) An optical sender according to claim 10, wherein said shutting down means comprises means for switching the operating point of said optical modulator and shutting down input of said main signal into said optical modulator when receiving said wavelength alarm.

16. (original) An optical sender according to claim 15, wherein said optical modulator is a Mach-Zehnder type lithium niobate modulator.

17. (original) An optical sender according to claim 15, wherein said optical modulator is a Mach-Zehnder type semiconductor modulator.

18. (original) An optical sender according to claim 15, wherein said optical modulator is an electroabsorption type modulator.

19. (previously presented) A terminal device for wavelength division multiplexing, comprising:

a plurality of optical senders for outputting optical signals having different wavelengths; and

an optical multiplexer for receiving said optical signals to output wavelength division multiplexed signal light,

wherein each of said optical senders comprises:

a light source for outputting a light beam;

an optical modulator for modulating said light beam in accordance with a main signal to output an optical signal; and

means for shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam, said wavelength alarm being provided inside of the respective optical sender,

said shutting down means comprising:

an optical element for receiving said optical signal output from said optical modulator; and

means for controlling said optical element so that the transmittance of said optical element is reduced when receiving said wavelength alarm.

20. (previously presented) An optical communication system for wavelength division multiplexing, comprising:

first and second terminal devices; and

an optical fiber transmission line for connecting said first and second terminal devices,

wherein at least one of said first and second terminal devices comprises:

a plurality of optical senders for outputting optical signals having different wavelengths; and

an optical multiplexer for receiving said optical signals to output wavelength division multiplexed signal light,

wherein each of said optical senders comprises:

a light source for outputting a light beam;

an optical modulator for modulating said light beam in accordance with a main signal to output an optical signal; and

means for shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam, said wavelength alarm being provided inside of the respective optical sender,

said shutting down means comprising:

an optical element for receiving said optical signal output from said optical modulator; and

means for controlling said optical element so that the transmittance of said optical element is reduced when receiving said wavelength alarm.

21. (original) An optical communication system according to claim 20, further comprising at least one optical amplifier arranged along said optical fiber transmission line.

22. (cancelled)

23. (previously presented) An optical sender according to claim 31, further comprising:

a circuit supplying a power to said light source; and

a power supervisory circuit monitoring on/off of supply of the power to said light source and outputting power alarm during a given time period from a time the supply of the power to said light source becomes on or off.

24. (original) An optical sender according to claim 23, wherein said power supplying circuit comprises a constant current source.

25. (previously presented) An optical sender according to claim 31, further comprising:

a wavelength monitor detecting the wavelength of said light beam; and

a circuit outputting said wavelength alarm when the wavelength detected by said wavelength monitor is deviated from a predetermined range.

26. (original) An optical sender according to claim 25, further comprising a first controlling device controlling said light source so that the wavelength detected by said wavelength monitor is maintained constant.

27. (original) An optical sender according to claim 26, wherein:

said light source comprises a laser diode; and

said first controlling device comprising a temperature controller controlling the temperature of said laser diode.

28. (original) An optical sender according to claim 25, wherein said wavelength monitor is provided between said light source and said optical modulator.

29. (original) An optical sender according, to claim 25, wherein said optical modulator is provided between said light source and said wavelength monitor.

30. (previously presented) An optical sender according to claim 25, wherein:

said light source comprises a laser diode outputting a forward beam and a backward beam; and

said forward beam being supplied to said optical modulator, said backward beam being supplied to said wavelength monitor.

31. (previously presented) An optical sender comprising:

a light source outputting a light beam;

an optical modulator modulating said light beam in accordance with a main signal to output an optical signal; and

a shutting down device shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam, said wavelength alarm being provided inside the optical sender,

said shutting down device comprising:

an optical element receiving said optical signal output from said optical modulator; and

a second controlling device controlling said optical element so that the transmittance of said optical element is reduced when receiving said wavelength alarm.

32. (original) An optical sender according to claim 31, wherein said optical element is a Mach-Zehnder type lithium niobate modulator.

33. (original) An optical sender according to claim 31, wherein said optical element is a Mach-Zehnder type semiconductor modulator.

34. (original) An optical sender according to claim 31, wherein said optical element is an electroabsorption type modulator.

35. (original) An optical sender according to claim 31, wherein said optical element is a semiconductor optical amplifier.

36. (previously presented) An optical sender according to claim 31, wherein said shutting down device comprises a switching device switching the operating point of said optical modulator and shutting down input of said main signal into said optical modulator when receiving said wavelength alarm.

37. (original) An optical sender according to claim 36, wherein said optical modulator is a Mach-Zehnder type lithium niobate modulator.

38. (original) An optical sender according to claim 36, wherein said optical modulator is a Mach-Zehnder type semiconductor modulator.

39. (original) An optical sender according to claim 36, wherein said optical modulator is an electroabsorption type modulator.

40. (previously presented) A terminal device for wavelength division multiplexing, comprising:

a plurality of optical senders outputting optical signals having different wavelengths; and

an optical multiplexer receiving said optical signals to output wavelength division multiplexed signal light,

wherein each of said optical senders comprises:

a light source outputting a light beam;

an optical modulator modulating said light beam in accordance with a main signal to output an optical signal; and

a shutting down device shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam, said wavelength alarm being provided inside of the respective optical sender, and said shutting down device comprises:

an optical element receiving said optical signal output from said optical modulator; and

a second controlling device controlling said optical element so that the transmittance of said optical element is reduced when receiving said wavelength alarm.

41. (previously presented) An optical communication system for wavelength division multiplexing, comprising:

first and second terminal devices; and

an optical fiber transmission line connecting said first and second terminal devices;

wherein at least one of said first and second terminal devices comprises,

a plurality of optical senders outputting optical signals having different wavelengths; and

an optical multiplexer receiving said optical signals to output wavelength division multiplexed signal light;

wherein each of said optical senders comprises:

a light source outputting a light beam;

an optical modulator modulating said light beam in accordance with a main signal to output an optical signal; and

a shutting down device shutting down said optical signal when receiving a wavelength alarm relating to the wavelength of said light beam, said wavelength alarm being provided inside of the respective optical sender, and said shutting down device comprises:

an optical element receiving said optical signal output from said optical modulator; and

a second controlling device controlling said optical element so that the transmittance of said optical element is reduced when receiving said wavelength alarm.

42. (original) An optical communication system according to claim 41, further comprising at least one optical amplifier arranged along said optical fiber transmission line.

43. (previously presented) An optical sender, comprising:

a light source outputting a light beam;

an optical modulator modulating the light beam in accordance with a main signal to output an optical signal; and

a shut-down device shutting down the optical signal when receiving a wavelength alarm relating to a wavelength of the light beam, the wavelength alarm being provided inside the optical sender.

44. (previously presented) A method, comprising:

outputting a light beam;

modulating the light beam in accordance with a main signal to output an optical signal; and

shutting down the optical signal when receiving a wavelength alarm relating to a wavelength of the light beam, the wavelength alarm being provided inside an optical sender.